

# Apple II Technical Notes



## Developer Technical Support

### Apple II GS

#### #46: DrawPicture Data Format

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This Technical Note describes the internal format of the QuickDraw II picture data structure.

This Technical Note presents the internal format of the QuickDraw II picture data structure for informational purposes only. You should **not** use this information to write your own bottleneck procedures; the only routines which should create and read PICT format files are those provided in QuickDraw II. If we added new objects to the picture definition, your program would not operate on new pictures. This Note documents this information for **debugging purposes only**.

### Picture Data Structure Definition

Pictures are stored in memory in the following format:

They begin with a WORD which indicates the mode of the port which was used to record when the picture was created. This information is useful when the picture is played back, possibly in a different graphics mode.

Following the WORD is a RECT which indicates the frame of the picture and is used for scaling when you redraw the picture. Following the RECT is the version number of this PICT format, then a series of word-sized opcodes which describe the sequences of QuickDraw II commands that were used to create the picture.

Name	Description	Size (bytes)
pictSCB	picture's scan line control byte	2 (high byte = 0)
picFrame	picture's boundary rectangle	8
version	picture version	2 (Currently \$8211)
opcode	operation code	2
<data>	operation data	variable, depending on opcode
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<data>	operation data	variable, depending on opcode

### Opcodes

As mentioned above, pictures are described by a series of opcodes which are used to record the QuickDraw II commands that created the picture. These opcodes are two bytes long and are usually followed by a number of parameters.

All currently defined opcodes and their parameters are listed below. Any opcodes not listed here are reserved.

<b>Opcode</b>	<b>Name</b>	<b>Description</b>	<b>Parm Bytes</b>	<b>Parameter Description</b>
\$0000	<b>NOP</b>	no operation	0	none
\$0001	<b>ClipRgn</b>	clip to a region	[region size]	region
\$0002	<b>BkPat</b>	background pattern	32	background pattern (8x8 pixels)
\$0003	<b>TxFont</b>	text font	4	Font Manager font ID (long)
\$0004	<b>TxFace</b>	text face	2	text face (word)
\$0005	<b>TxMode</b>	text mode	2	text mode (word)
\$0006	<b>SpExtra</b>	space extra	4	space extra (fixed)
\$0007	<b>PnSize</b>	pen size	4	pen size (point)
\$0008	<b>PnMode</b>	pen mode	2	pen mode (word)
\$0009	<b>PnPat</b>	pen pattern	32	pen pattern (8x8 pixels)
\$000A	<b>FillPat</b>	fill pattern	32	fill pattern (8x8 pixels)
\$000B	<b>OvSize</b>	oval size	4	oval size (point)
\$000C	<b>Origin</b>	origin	4	origin (point)
\$000D	<b>TxSize</b>	text size	2	text size (word)
\$000E	<b>FGColor</b>	foreground color	2	color (word)
\$000F	<b>BGColor</b>	background color	2	color (word)
\$XX11	<b>Version</b>	version	0	none: high byte = version (currently \$82)
\$0012	<b>ChExtra</b>	character extra	4	char. extra (fixed)
\$0013	<b>PnMask</b>	pen mask	8	mask (8 bytes)
\$0014	<b>ArcRot</b>	arc rot	2	Reserved (related to things drawn w/patterns). (word)
\$0015	<b>FontFlags</b>	font flags	2	font flags (word)
\$0020	<b>Line</b>	line	8	pnLoc (point), newPt (point)
\$0021	<b>LineFrom</b>	line from pen loc.	4	newPt (point)
\$0022	<b>ShortLine</b>	short line	6	pnLoc (point), dv, dh (signed bytes)
\$0023	<b>ShortLFrom</b>	ditto from pen loc	2	dv, dh (signed bytes)
\$0028	<b>LongText</b>	long text	5+text	txLoc (point), count (byte), text
\$0029	<b>DHText</b>	hor. offset text	2+text	dh (unsigned byte), count (byte), text
\$002A	<b>DVText</b>	vert. offset text	2+text	dv (unsigned byte), count (byte), text
\$002B	<b>DHDVText</b>	offset text	3+text	dv, dh (unsigned bytes), count (byte), text

\$002C	<b>RealLongText</b> very long text	6+text	<b>txLoc</b> (point), <b>count</b> (word), text
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Opcodes between \$0030 and \$008C are a combination of a graphic verb and a graphic object, as listed below (where “V” stands for the graphic verb, and “X” is a stands for the graphic object). For example, \$0069 means **PaintSameArc**, and is followed by two one-word parameters.

**Graphic Verbs:**

\$00X0	Frame...	frame something	[Specific to object type: see below.]
\$00X1	Paint...	paint something	
\$00X2	Erase...	erase something	
\$00X3	Invert...	invert something	
\$00X4	Fill...	fill something	
\$00XV+8	...Same...	draw same thing somehow	[See below; <u>underlined</u> parms do not appear.]

**Graphic Objects:**

\$003V	...Rect	draw a rectangle somehow	8 (0 if – SameRect) <u>rect (2 points)</u>
\$004V	...RRect	draw a round rect somehow	8 (0) <u>rect (2 points)</u>
\$005V	...Oval	draw an oval somehow	8 (0) <u>rect (2 points)</u>
\$006V	...Arc	draw an arc somehow	12 (4) <u>rect (2 points)</u> , start, arc angle (words)
\$007V	...Poly	draw a polygon somehow	[polygon size] (0) <u>polygon</u>
\$008V	...Rgn	draw a region somehow	[region size] (0) <u>region</u>
\$0090	BitsRect	copybits, rect clipped	variable <sup>†</sup> (see below, but without maskRgn)
\$0091	BitsRgn	copybits, rgn clipped	variable <sup>†</sup> (see below)
\$00A1	LongComment	long comment	4+data kind (word), size (word), data

**†Bits... data:**

origSCB	original scan line control byte	2	SCB (word — high byte = 0)
BWvsColor	black and white vs. color	2	reserved (word)
width	width of pixel image in bytes	2	width (word)
boundsRect	bounds rectangle	8	rect (2 points)
srcRect	source rectangle	8	rect (2 points)
destRect	destination rectangle	8	rect (2 points)
mode	transfer mode	2	pen mode (word)
maskRgn	mask region (BitsRgn ONLY!)	[region size]	region
pixData	pixel image	[pixdata size]	width*(bounds.bottom-bounds.top)

**Differences Between IIgs Pictures and Macintosh Pictures**

1. QuickDraw II pictures are modeled after PICT2 on the Macintosh, which use two bytes for its opcodes and data (the exception to this is the \$11 (version) opcode, which is followed by a one-byte parameter). Macintosh PICT 1.0 formats, which use one-byte opcodes, would have to undergo extensive modifications to be displayed on the IIgs.

2. There is no `EndOfPicture` opcode on the IIgs as there is on the Macintosh. Also, the first word of the picture is a `pictSCB`, not the length of the picture. The picture size is determined solely by the size of the handle on the IIgs. There is also no picture header on the IIgs as on the Macintosh.
3. The number sex of the Macintosh is opposite that of the Apple IIgs. The Macintosh stores the high bytes of words and long words first, whereas the IIgs stores the low byte first.
4. The following Macintosh picture opcodes are not available on the IIgs: `txRatio`, `PackBitsRect`, `PackBitsRgn`, `shortComment`, `EndOfPicture`.
5. QuickDraw II defines the following opcodes that the Macintosh does not: `ChExtra` (\$12), `PnMask` (\$13), `ArcRot` (\$14), `FontFlags` (\$15), and `RealLongText` (\$2C).

## Notes on the Interpretation of IIgs Pictures

- The state of the pen, the clip region, various patterns and colors, and the origin of the current port is saved before a picture is drawn, and restored afterwards. The current port is set up in a default state equivalent to that of a newly created port just before drawing begins. Picture opcodes act just like their QuickDraw II tool counterparts, with a few exceptions.
- Two pen locations are tracked as the picture is drawn, one for lines and one for text. Thus, `LineFrom` always draws from the end of the last line, regardless of any intermediate text opcodes.
- Text calls do not change the position of the “text pen,” as do normal QuickDraw II text calls. Thus, if a picture contains two lines of text, the second one directly below the first, the second will be stored using a `DVtext` opcode.
- `DrawPicture` performs considerable setup before it draws pictures. Among other things, it calls `InstallFont`, which is a Font Manager call. If you are going to support pictures in your application, you should load and start the Font Manager.

## Further Reference

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- *Apple IIgs Toolbox Reference, Volume 2*